Voices and Visions

Creating the Future through Dialogue

How to Achieve Society 5.0 and Deliver Wellbeing without Exceeding Planetary Boundaries

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Discussion

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Smart city initiatives are underway in various of locations in Japan, serving as preliminary explorations of Society 5.0, a people-centric super-smart society envisioned in the government's 5th Science and Technology Basic Plan of 2016. Alongside this, the University of Tokyo and Hitachi have been engaging in joint research on two topics in particular that are aimed at achieving Society 5.0: the creation of sustainable and people-centric smart cities and the formulation of a vision for the energy systems of the future. This scheme for collaboration between industry and academia being undertaken at the Hitachi-UTokyo Laboratory has been recognized as a model for the harmonious collaborative creation (co-creation) that is essential to overcoming societal challenge. Globally, the situation is becoming increasingly complex, with worsening climate change and a changing international order. Japan, meanwhile, is facing the new reality of depopulation. Combining people's wellbeing with a society that can stay within planetary boundaries will be crucial to overcoming these challenges. In this article, Teruo Fujii, President of the University of Tokyo, and Toshiaki Higashihara, Director and Executive Chairman of Hitachi, Ltd., engage in a discussion that sheds light on how the University of Tokyo and Hitachi are addressing this task.

Changing Environment for both University and Company

Higashihara: I am delighted to have this opportunity to discuss Society 5.0 with you today, as it is one of the research topics being addressed by the Hitachi-UTokyo Laboratory.

Following your appointment as President of the University of Tokyo in April 2021, you published new guiding principles of the university called UTokyo Compass that came out in September of that year. Can you please tell us what you were seeking to achieve by this?

Fujii: UTokyo Compass was titled "Into a Sea of Diversity: Creating the Future through Dialogue" and highlighted three core values: "creation through dialogue," "diversity and inclusion," and "a university for everyone in the world." Along with a global agenda that includes climate change and the pandemic, humanity is also faced with the threat to multilateralism posed by Russia's invasion of Ukraine. In such a world, universities have an even greater role to play as places where people from many different walks of life can engage in dialogue.

Dialogue is the act of trying to learn something unknown. To discover and understand something unknown, we need to pose questions. By sharing and thinking about common questions through dialogue, we can build mutual understanding and trustful relationships among people. Universities can serve as a place for creating knowledge and building the future, discovering solutions to a variety of different challenges through dialogue, not only within academia, but also with people from outside or overseas who come from different backgrounds. When we fulfill this mission, I believe that universities are contributing to international society. I am conscious of how co-creation between industry and academia, as exemplified by the Hitachi-UTokyo Laboratory, provides a framework for creating the knowledge to take on difficult challenges through dialogue.

Higashihara: Dialogue is also a key concept in today's corporate activities. This year is the 113th since Hitachi was founded, and over the 100 years or so of our business, we have largely pursued a "product out" approach in which factories have played a central role. In recent years, however, that approach has undergone considerable change as co-creation with customers has come to play an ever more important part. Co-creation means sharing a vision and goals with the customer, identifying the challenges that need to be overcome to achieve those goals, and making use of digital technologies to find

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solutions. To borrow your own words, it is about dialogue as a business model.

While products remain important, these increasingly large and complex challenges cannot be resolved by the conventional approach to manufacturing. Along with the immediate challenges facing them and their customers, the companies of today also need to take a broader and more long-term perspective that incorporates the resolution of societal challenges into their businesses. Doing so calls not only for co-creation with individual customers, but also for working through consortiums of companies; collaboration across industry, academia, and government; and dialogue with non-profit organizations (NPOs) and communities.

In the "product-out" era, value was delivered through productivity-boosting efficiency gains and profit-enhancing cost savings. Nowadays, in contrast, what customers are seeking is changing toward forms of value that encompass societal challenges. For example, rather than just price and quality, when choosing products and services, customers are starting to prioritize things like the use of recycled materials and whether materials procurement and production respect human rights and are not damaging to the environment. With planetary boundaries (global-scale environmental issues) and wellbeing (individual happiness based on leading a life that is both mentally and physically healthy) becoming key considerations for business, I have come to recognize the importance of how co-creation between industry and academia brings a transformation in our thinking and an appreciation of new ways of looking at things that incorporate these ideas.

Acceleration of Green Transformation

Fujii: While I believe that climate change represents the greatest societal challenge that we currently face, what we have now is better described as a "climate crisis" whereby continuing along our current path will result in action being too little, too late. In recognition of the need for a fundamental reorganization of social and economic systems as well as the structure of industry, we highlighted

green transformation (GX) as one of the key pillars of the UTokyo Compass action plan, with a three-tiered approach that addresses the issue at the global, national, and university levels.

At the global level, the Center for Global Commons at the University of Tokyo[*1] has played a central role in developing and publishing the "Global Commons Stewardship Index"[*2]. The objective is to stimulate international policy debate on how to safeguard the global commons and to encourage behavioral change at various levels of society in individual nations.

At the national level in Japan, we established the Energy Transition Initiative – Center for Global Commons (ETI-CGC) as a platform for investigating how Japan can make the energy transition to carbon neutrality by 2050, with participation by senior managers from 13 Japanese companies, including yourself. The intent is to develop Japan's pathways for achieving both carbon neutrality and wellbeing, including the formulation of policy proposals.

At the university level, we are playing our part in pursuing the goal of net-zero by 2050, participating as an academic partner in "Race to Zero," an international campaign launched by the United Nations Framework Convention on Climate Change (UNFCCC). We formulated and published our action plan for achieving this in October 2022, entitled "UTokyo Climate Action". Based on this plan, students, faculty, and staff members will work together to strengthen sustainability at the university.

Higashihara: Government action on GX has included the July 2022 inaugural meeting of the GX Implementation Council chaired by the prime minister. Against a backdrop of ongoing energy supply concerns, this included work on what needs to be done to achieve carbon neutrality by 2050 and the creation of a roadmap for the JPY150 trillion of combined public and private investment planned over the next 10 years[*3].

As for industry, the Japan Business Federation (Keidanren) is seeking to achieve "Society 5.0 with Carbon Neutral," its term for a new economy and society that features fundamental change in how energy is sourced, innovation in the processes of production, wider adoption of innovative products for decarbonization of the transportation and consumer sectors, public behavior change, and a transformation in living practices.

Taking an All-encompassing View of Environmental Problems

Higashihara: When considering fundamental changes in the sources of energy, it is vital to differentiate between the short- and medium-to-long-term future. While an expansion of renewable energy is essential in the long term, Japan will face electricity shortages in 2030 unless it makes progress on restarting its nuclear power plants. To ensure security of supply, we need to structure our electric power supply system in a way that treats nuclear power generation as a significant source of baseload power. In terms of thermal power generation, we need to establish a clear pathway toward reducing it, while also reducing carbon dioxide (CO_2) emissions by making greater use of alternatives such as hydrogen or ammonia, which can be mixed in with existing fuels. At the same time, there is also a need for longer-term action in the form of fundamental research into carbon capture and storage (CCS) and carbon capture utilization and storage (CCUS) so that it will be ready for practical implementation in the decade starting around 2040.

On the demand side, wider adoption of distributed power sources with the use of batteries or artificial intelligence (AI) for energy management will likely play a key role, facilitating the use of renewable sources of energy by

*1 An organization launched in 2020 with the goal of serving as a facilitator, guiding the reform of societal and economic systems through co-creation with leaders from a wide range of fields in order to secure the earth as a global commons, humanity's common property. With the aim of building a sustainable future for both people and the planet, the center is working on a common international intellectual framework for managing the global commons (global commons stewardship). Based on this framework, the center is also working with a diverse range of stakeholders to encourage the transformation of societal and economic systems.

*2 An overall indicator that is used to score nations for their impact on climate change and biodiversity and to encourage action by serving as a basis for comparison. Jointly developed by the Sustainable Development Solutions Network (SDSN) of the United Nations, Yale University, and the Center for Global Commons at the University of Tokyo, indicators have been published for more than 100 nations to date.

*3 A draft of the "Basic Policy for the Realization of GX" with 10-year roadmap was presented at the Fifth GX Implementation Council held on December 22, 2022.

communities, factories, offices, and families together with energy efficiency measures for saving electricity.

Carbon neutrality is far from the only challenge, however, and it is also important that we think about how to sustain global systems and the ecosystem. We live in a time when we need to be thinking about the impacts we have on the environment in comprehensive and global terms, encompassing every stage from materials and other resources to the factory and office, transportation, use of products and services, and their ultimate disposal and recycling. We need to be deploying technologies that can reduce the load on the environment, not only in Japan, but also elsewhere such as in Asia and the Global South.

Fujii: As you say, it is vital to adopt an all-encompassing view and address the issues in a scientific manner. The information disclosure framework for organizations involved in sustainability has been expanded from the Taskforce on Climate-related Financial Disclosure (TCFD) to the Taskforce on Nature-related Financial Disclosures (TNFD), calling for reporting, not just on CO_2 emissions in the supply chain, but also on assessments of the risks and opportunities posed to the natural environment and biodiversity across all steps in the value chain. Considering issues such as those associated with food or human rights in procurement and production, there is a need for further research into how we can monitor the activities of companies and other organizations in all their different facets together with the collection of this data and the calculation of indicators.

Higashihara: Transparency and analysis are essential if effective action is to be taken. This in turn calls for data collection and analysis platforms. With the European Union (EU) already working on its Gaia-X project to establish integrated infrastructure for the coordination of data across different companies, I feel that Japan, too, should be talking about open platforms for the integrated collection and coordination of data between companies in Japan and Asia that will facilitate the provision of services.

Need to Adopt a User Perspective

Higashihara: Alongside planetary boundaries, Hitachi also sees "wellbeing" as an important consideration, one that is highlighted as a key concept in the people-centric super-smart society of Society 5.0. Smart cities are seen as providing a preview of Society 5.0. At Smart City Institute Japan*4, meanwhile, in which Hitachi is participating alongside academics from the University of Tokyo and where wellbeing is defined as living a fulfilling life, support is being given to work on smart cities that seeks to improve on this measure. The institute has also developed the Liveable & Well-Being City Indicators for use in activities taking place around the country. Intended specifically for Japan, these indicators can be applied to urban developments that enhance the wellbeing of community residents.

While people tend to think of smart cities as greenfield developments that start from a blank slate, brownfield projects in which digital technology and data are put to work to transform existing cities are likely a more realistic solution. One notable example comes from Kakogawa City in Hyogo Prefecture where an investigation into the potential for installing surveillance cameras to reduce the crime rate was prompted by community feedback to also incorporate a monitoring service for children and the elderly that works by using beacon tags*5, thereby improving the town's livability. The requirements for establishing a smart city are: (1) leadership, (2) clearly defined objectives and key performance indicators (KPIs) for the planned activities, and (3) community involvement. In the case of Kakogawa City, however, three key elements that came together to make their project a success were, I believe: (1) the mayor, (2) the installation of a crime prevention and monitoring service, and (3) the adoption of a feedback scheme that can collect a wide range of community views by means of a website.

An advantage of brownfield projects is that they are able to make use of community feedback while changes are being put in place. In recent years, a growing number

*4 A not-for-profit organization established to promote the expansion and enhancement of smart cities in Japan.

*5 A public-private project being jointly undertaken by Kakogawa City and a number of private-sector businesses. The project has installed surveillance cameras equipped with beacon tag detectors in the area around an elementary school and along the paths taken by children going to and from school. The system is used to monitor the children and others, including elderly people suffering from dementia. It works by updating a smartphone app belonging to the person's caregiver or family with details of their movements whenever they pass near one of these detectors while wearing the tag.

of people have come to treat societal challenges as matters of personal concern to the extent that they are prepared to involve themselves in urban development. I am hopeful that brownfield smart city projects will prove to be the catalysts that initiate the transition to Society 5.0. In the private sector, likewise, we want to play our part in this movement through means such as digital technology.

Fujii: As a university, being a place where different types of people can come together is one of our defining characteristics and, as such, I hope that we can serve as a place for community participation and for connecting stakeholders together.

For Society 5.0, it is important to clarify who we are talking about when we refer to it as "people-centric." As you mentioned earlier, whereas the evolution of 20th-century industry was more about the things that mattered to producers, the progress of digitalization since we entered the 21st century has placed greater weight on the perspectives and values of the people who use products and services.

This change now informs the debate about smart cities, where a switch in focus toward user considerations is called for in fields like social infrastructure and in public services such as healthcare and education. Those in healthcare are asking themselves what constitutes value for patients, while for us in the education sector, we need to be rethinking what is needed if students are to study the things they really want to study. This is a time for the providers and consumers of services to be getting together to engage in genuine dialogue and to think about issues of concern and what constitutes value in those services.

Treating Issues as Matters of Personal Concern

Fujii: For myself, I have spent a lot of time studying the ocean and have been engaged in the Ocean Monitoring Network Initiative (OMNI). I have launched this project to perform large-scale oceanographic surveys using low-cost sensor systems. To achieve this, the project has drawn on design capabilities to develop sensors and data platforms for collecting a variety of oceanographic data such as water temperature and salinity, with involvement by

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Joined Hitachi, Ltd. in 1977 after graduating with a degree in electrical engineering from the Faculty of Engineering at Tokushima University. He obtained a Master of Science in Computer Science at Boston University in 1990. His past roles have included COO of the Information & Telecommunication Systems Group, President of Hitachi Power Europe GmbH, President and Representative Director of Hitachi Plant Technologies, Ltd., Vice President and Executive Officer of Hitachi, Ltd., President & CEO of Hitachi, and Executive Chairman & CEO of Hitachi. He took up his current position in April 2022.

the general public as well as researchers. Participation in the project fosters a sense of personal connection with the ocean environment, with activities including workshops for elementary, junior high, and high school students and helping them come up with ideas for sensing devices. Having more people collecting observations increases the volume and resolution of the oceanographic data while also providing an opportunity for personal behavioral change as people gain a shared awareness of the problems. I hope that this project will serve as a model for using dialogue with the community as a means of overcoming challenges.

Rather than being conferred by other people, I believe that wellbeing is something we acquire when we voluntarily engage with each other to make society better.

Higashihara: That is right. Because wellbeing means different things to different people, if everyone pursues happiness in their own way, they may end up just getting in each other's way, like trying to inflate a lot of balloons in the same small space. What is called for, rather, is empathy and to consider the viewpoints of others. The same applies to planetary boundaries, a problem where it is important that we think in terms of win-win rather than zero-sum outcomes.

The best overall outcomes can be achieved by local government, companies, universities, and residents adopting this approach to working with one another to address local issues, with these communities working together seamlessly based on Japan's Vision for a Digital Garden City Nation. It is when this happens that I believe wellbeing will be improved.

Fujii: Working with the local community is also important for us. In November 2022, we entered into a comprehensive partnership agreement with Wakayama Prefecture. The aim of the agreement is to help resolve local issues and create a distinctive regional society through academic research and the exchange and training of personnel.

While this is the third such agreement, we have reached at the local government level, the earlier ones being with Mie and Fukushima prefectures, a number of our faculties were already doing work in Wakayama. The Institute of Industrial Science to which I belonged has set up a laboratory at Kada in Wakayama City to conduct studies aimed at regional revitalization, while the Research Center for Advanced Science and Technology partnered with Kongobu-ji, the Main Temple of the Koyasan Shingon Sect, as well as with Koyasan University and Koya Town to hold the Koyasan Conference. Similarly, our Graduate School of Humanities and Sociology has entered into an agreement with Shingu City involving the establishment of a satellite facility and the hosting of the UT Jimbun-Kumano Forum. The graduate school has also entered into an agreement with Kitami City in Hokkaido to engage in joint work in which Shingu City will also participate, with plans to go deeper into areas such as multi-regional cross-cultural studies.

We have also embarked on a "field study-based partnership project between local governments and UTokyo." This involves students spending time at local government agencies to conduct on-site studies of local issues and come up with ways of resolving them with assistance from faculty and staff members. During the 2022 academic year, we worked with 19 such local governments and communities at locations across Japan.

Improving Diversity, Equity, and Inclusion through Mutual Understanding

Higashihara: Diversity and inclusion are both key considerations when seeking to create a people-centric society, and together with equity, these concepts have been a focus of much attention over recent times, collectively known by the abbreviation "DEI." For Japan to retain its vitality as it confronts the reality of depopulation, it is essential that both the private and public sectors promote globalization and diversity more than ever before. To this end, Hitachi has declared a goal of increasing the percentage of female and non-Japanese executive and corporate officers to 30% by 2030.

Equity, being about the rectification of imbalances with respect for difference, is not the same as equality. Rather than something that can be expressed in simple rules, it is about formulating rules that are consistent with an understanding of people's individuality and of local culture and history, or of providing support and creating a level playing field that leads to a society that leaves no one

behind. In other words, it is about mutual understanding. It means first understanding and accepting the values of other people, and then having them understand your values. While it may seem trivial, I believe that order is crucially important.

Fujii: I agree. Building relationships of trust through dialogue demands both understanding and respect for others as you mentioned. As I spoke about earlier, the University of Tokyo is seeking to become "a university where anyone in the world would want to come and join." Being accepting of people from a range of different backgrounds is important in academia just as it is in business. In order to raise the level of our research, debate needs to encompass diverse viewpoints. DEI is implicit in the topics like Society 5.0 and wellbeing that we are addressing in our discussion and I believe that they constitute genuine value.

One of the ways in which universities need to respond to depopulation is by fostering and utilizing a diverse range of people so as to maintain national vitality. As part of such efforts, we aim to recruit 300 female teaching staff by the 2027 academic year. By raising the percentage of female faculty and supporting their activities, our hope is that this will also increase the number of female students. Likewise, increasing the number of international students should foster deeper understanding and allow them to develop closer ties to Japan while also helping to improve diversity domestically.

Disability inclusion is also essential. We have students who get around the university in wheelchairs and the Research Center for Advanced Science and Technology is engaged in an assessment and rehabilitation project whereby people with disabilities or illness study their own concerns, such as the difficulties they experience and the ways in which their illness manifests in their daily lives. Providing an inclusive environment for education and research not only promotes innovation, but also serves as a model for other organizations.

Responsibilities of Science and Technology

Higashihara: Along with changes in attitude, the way in which DEI is achieved at a technical level also raises issues. For example, as long as they are able to operate the relevant devices, new digital realms such as the metaverse allow people to communicate, work, and study wherever they live and without the constraints of time, regardless of their age, gender, or physical condition. If not only sight and sound, but also other senses such as touch, smell, and taste can be provided as virtual experiences, then the possibilities could extend to the immersive study of history or the interactive acquisition of skills and expertise.

On the other hand, these new technologies have both advantages and disadvantages and come with ethical issues. Given that virtual reality is artificial, how far can we allow it to go? While Hitachi provides training to our researchers and engineers about the ethics of emerging technologies like gene recombination, genome editing, and regenerative medicine, there is also an urgent need to establish effective rules through a process that includes public debate and assessment.

Fujii: The ethical, legal, and social issues (ELSI) raised by science and technology have themselves become a topic of academic study. Moreover, the EU has, in recent years, been addressing the concept of responsible research and innovation (RRI).

As exemplified by the issue of genetically engineered foods, new technologies can foster uncertainty and distrust in science when they first enter the public realm. To avoid this, rather than a closed debate among the ranks of scientists, it is important to engage in dialogue with the public from the early stages of research and development. While responsibility as a concept also embodies ethics, I see it as having two aspects when it comes to research, namely the responsibility to "create" scientific knowledge and the responsibility to "utilize" scientific knowledge. Scientists and other researchers are called upon to fulfill both of those responsibilities, which is why we include "Promote Responsible Research" as one of the 20 goals in the UTokyo Compass.

Mutual Engagement for Development of Human Resources and Resolution of Challenges

Fujii: Given a global agenda including the ethical questions of new technology as well as climate change and the new international order characterized by the COVID-19 pandemic and the invasion of Ukraine, a mountain of issues call for our action. Today's discussion has reinforced for me how our ability to overcome these challenges is enhanced by companies like Hitachi and universities like ours working together to take them on.

As a university, providing students with on-the-ground experience is a particular emphasis of ours when it comes to addressing ever more complex challenges. We promote internships both in Japan and overseas in the hope that knowledge of the practical world will encourage students to make a personal commitment to action on these challenges. I also see an important place for startups when it comes to initiatives for addressing challenges. As many students want to be involved with startups in the social as well as the technology sphere, such as businesses that can make a social contribution on the ground in the Global South, for example, the university is looking for ways in which we can support them.

Higashihara: While we spoke earlier about the university's role in developing talent, companies also have an important role to play in fostering people who can take on a global agenda. This is about having a personal commitment to addressing societal challenges from a global perspective and resolving those challenges in a way that brings people onboard based on mutual understanding. What I would like to see is for us to build a relationship in which, through mutual engagement, we can resolve societal challenges together. More than just internships, this could involve things like our people going to the university to learn or having university researchers come to us.

Fujii: I very much hope we can do that. When it comes to the fostering of talent at universities, I am conscious of the need for us to build up our capabilities for acquiring understanding of other subjects as well as our own, or for engaging in team-based research with specialists from other fields. It is by acquiring such capabilities that our engagement with companies will deliver benefits.

Higashihara: With a philosophy like that, the Hitachi-UTokyo Laboratory will have a more important role to play than ever. The pursuit of interdisciplinary research is an area worthy of particular attention along with incorporating public feedback into efforts to create Society 5.0, and we need to make further progress toward it serving as a forum for dialogue that encourages active debate and the exchange of views between companies and universities along with numerous other stakeholders. I look forward to its coming up with many good ideas that will help Hitachi toward our goal of using the resolution of societal challenges as a means of creating a society that delivers wellbeing to everyone without overstepping planetary boundaries. Thank you for your time today.